REPT – Environmental Policy Support Tool for Recycling in Islands

The REPT project started in January 2009 under the coordination of the Cyprus Ministry of Interior and its total duration is thirty months. It is supported by the European Commission through the LIFE financial instrument and is the first LIFE+ Environment Policy and Governance project awarded to Cyprus. The project objective is to analyse and improve recycling and management of packaging waste and waste from electrical and electronic equipment (WEEE) in island states and countries with islands, targeting optimal and environmental solutions.

REPT partnership

MINISTRY OF INTERIOR, CYPRUS • DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, UNIVERSITY OF CYPRUS
P. NICOLAIDES AND ASSOCIATES LTD • GREEN DOT (CYPRUS) PUBLIC CO LTD • GREEN DOT MALTA LTD
HELLENIC RECOVERY RECYCLING CORPORATION • ECO EMBALLAGES

List of acronyms

DST	Decision Support Tool
REPT	Environmental Policy Support Tool for Recycling in Islands
kWh	kilowatt-hour
tn	ton
MRF	Material Recycling Facility
PPW	Packaging and Packaging Waste
WEEE	Waste Electrical and Electronic Equipment

REPT – DST: Decision Support Tool for Recycling in Islands

Overview

This Decision Support Tool (DST) for waste management was developed during the development of the project 'Environmental Policy Support Tool for Recycling in Islands (REPT)'. The project is co-funded by the EC through the LIFE + Environmental Policy and Governance program.

The DST is developed to provide national and local authorities as well as private organizations with a tool able to assist decision making in waste management related activities. The tool allows for the assessment of both financial and environmental factors thus assisting the user to identify the most environmentally friendly waste management options.

As part of a greater project focused on recycling in islands, the DST was developed having in mind its application in state islands and countries that include islands. However, its application is not limited to use by any country or local authority or even private organizations and individual users.

The DST is provided with a database that includes example applications of the Green Dot Organizations of the four countries participating in this effort: Cyprus, Malta, Greece and France and data relevant to the waste management of Waste Electrical and Electronic Equipment (WEEE) and municipal Packaging Waste.

Key Characteristics

The key characteristics of the DST application involve:

- Estimation of quantities of produced waste for a specific waste stream for a given year
- Forecast of the waste quantities produced for a specific waste stream for a period of 20 years
- Creation of waste management scenarios for the management of a specific waste stream or co-management of multiple waste streams
- Estimation of financial cost for every process of a selected scenario
- Estimation of environmental externalities for every process of a selected scenario
- Estimation of the financial cost and environmental externalities of the selected waste management scenario
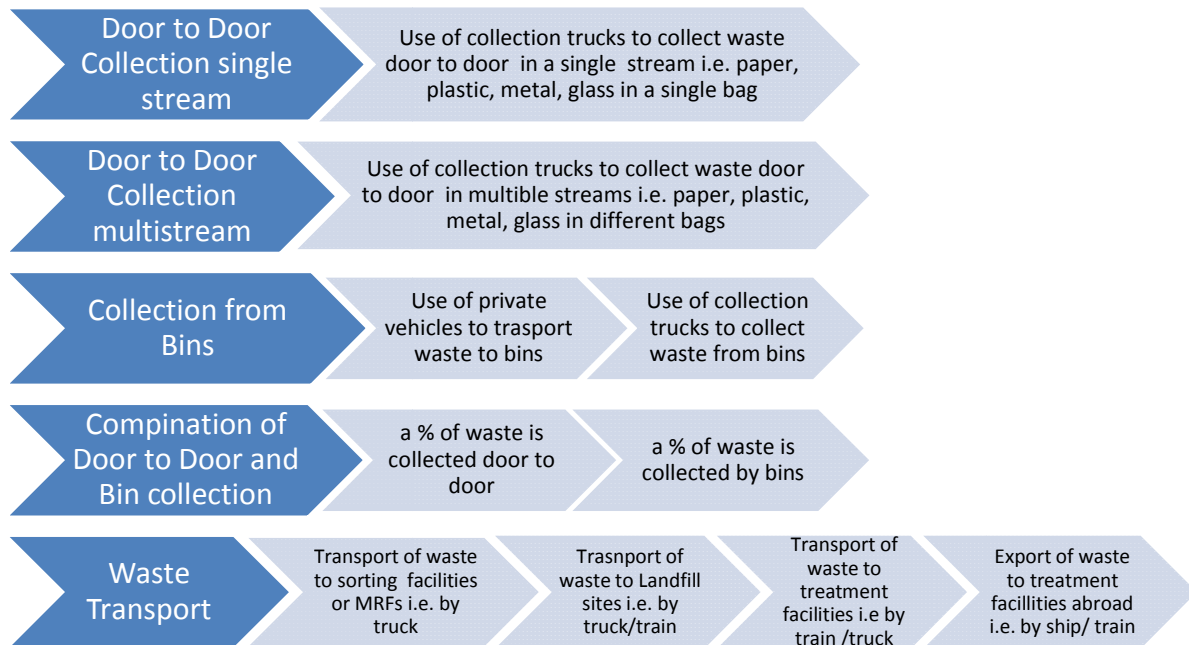- Database that includes environmental externalities and cost data

Philosophy of the DST

The philosophy of the DST is simple and based on the practical application of waste management procedures. The DST works on two levels, the "Scenario" level and the "Process" level.

A "Process" is described as the individual activities carried out during waste management i.e. collection of waste. The DST considers three main process types: collection/ transport, sorting, treatment.
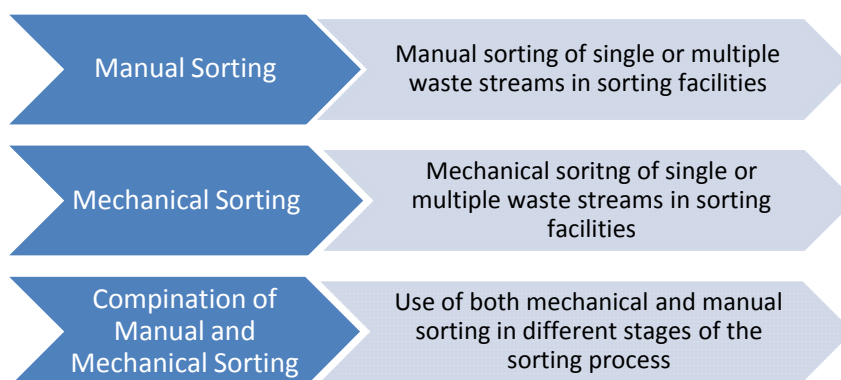
- **Collection/ Transport:** these processes are considered jointly as the share the same characteristics that involve the use of vehicles to collect waste and transport them from one process to another.
- **Sorting:** involves the sorting of waste in a sorting facility or a Material Recovery facility (MRF). Sorting may involve separation of specific waste streams i.e. glass, paper, metal from a mixed stream of waste or the separation of a single waste stream into different grates and the removal of contaminants. One example would be the mechanical color sorting of waste glass and the removal of ceramic or metallic contaminants.
- **Treatment:** is any process that changes the characteristics of a waste to make it less of an environmental threat.
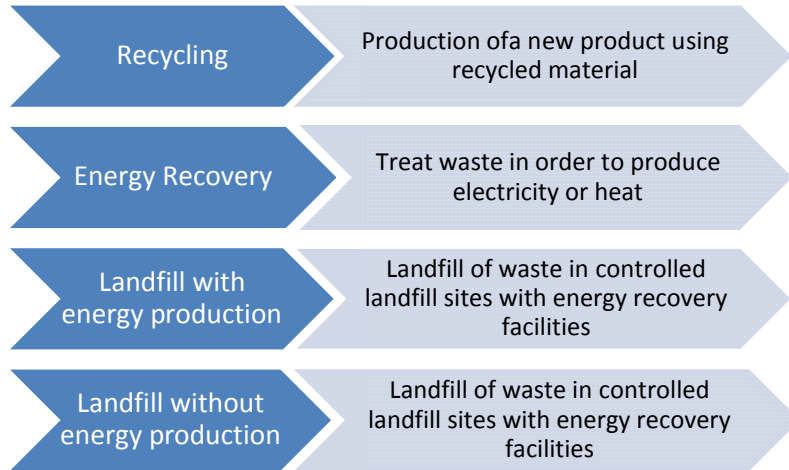
Each process type may include as many processes as the user defines. The main processes for each process type i.e. for PPW management, are presented in the diagrams below.

Collection/Transport:

Door to Door Collection single stream	Use of collection trucks to collect waste door to door in a single stream i.e. paper, plastic, metal, glass in a single bag
Door to Door Collection multistream	Use of collection trucks to collect waste door to door in multible streams i.e. paper, plastic, metal, glass in different bags

Collection from Bins	Use of private vehicles to trasport waste to bins	Use of collection trucks to collect waste from bins
Compination of Door to Door and Bin collection	a % of waste is collected door to door	a % of waste is collected by bins

Waste Transport	Transport of waste to sorting facilities or MRFs i.e. by truck	Trasnport of waste to Landfill sites i.e. by truck/train	Transport of waste to treatment facilities i.e by train /truck	Export of waste to treatment facillities abroad i.e. by ship/ train

Sorting:

Manual Sorting	Manual sorting of single or multiple waste streams in sorting facilities
Mechanical Sorting	Mechanical soritng of single or multiple waste streams in sorting facilities
Compination of Manual and Mechanical Sorting	Use of both mechanical and manual sorting in different stages of the sorting process

Treatment:

Recycling	Production of a new product using recycled material
Energy Recovery	Treat waste in order to produce electricity or heat
Landfill with energy production	Landfill of waste in controlled landfill sites with energy recovery facilities
Landfill without energy production	Landfill of waste in controlled landfill sites with energy recovery facilities

The "Scenario" is described as a sequence of processes that make up the waste management procedure of a selected waste stream. Using different combinations of processes, different scenarios for a specific waste stream could be created. After the financial and environmental costs of the scenarios are estimated, the user can identify the most economic or environmentally friendly scenario.

Loading REPT-DST

Choose Start > Programs > LIFE DST > DST Application

Getting Familiar with the REPT-DST main screen

The DST application has an easy to use interface. Below, you will find an overview of the application's main components. Before beginning your work within REPT-DST, take a few minutes to get familiar with them.
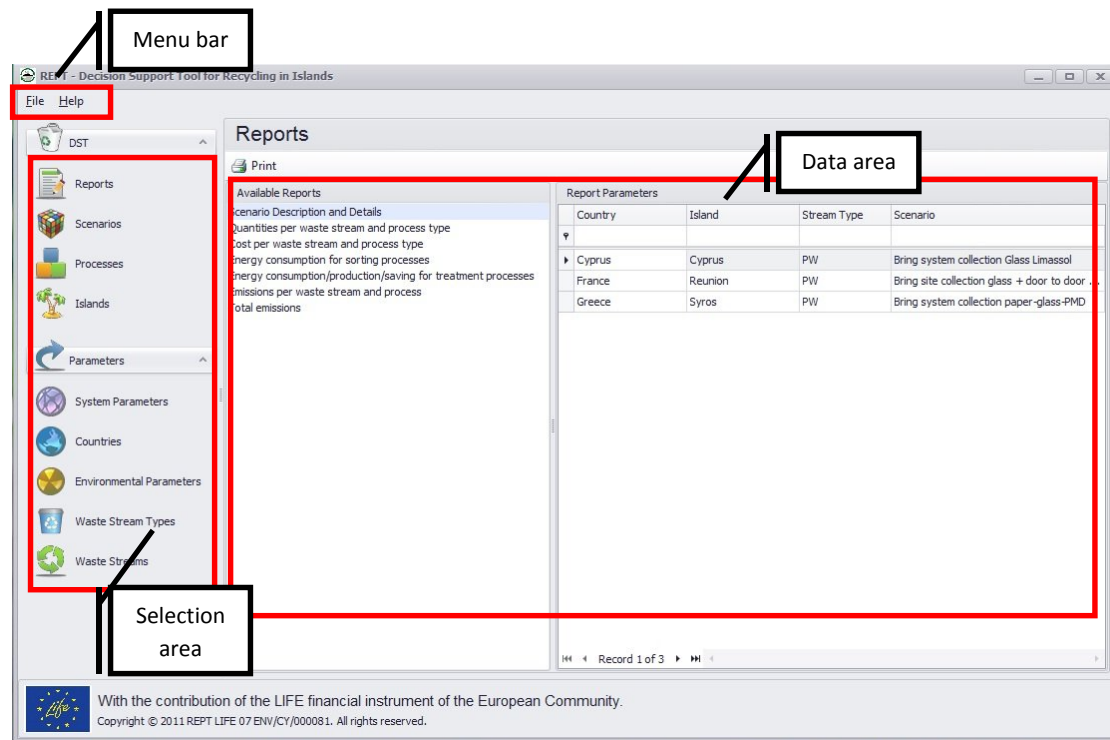
Menu bar

The Menu bar contains 2 items:

1. File
2. Help

Choose File > Exit in order to exit the application.

Choose File > About in order to see the about screen.

Choose File > User manual in order to load this guide.

Selection area

Click on one of the 9 available choices:
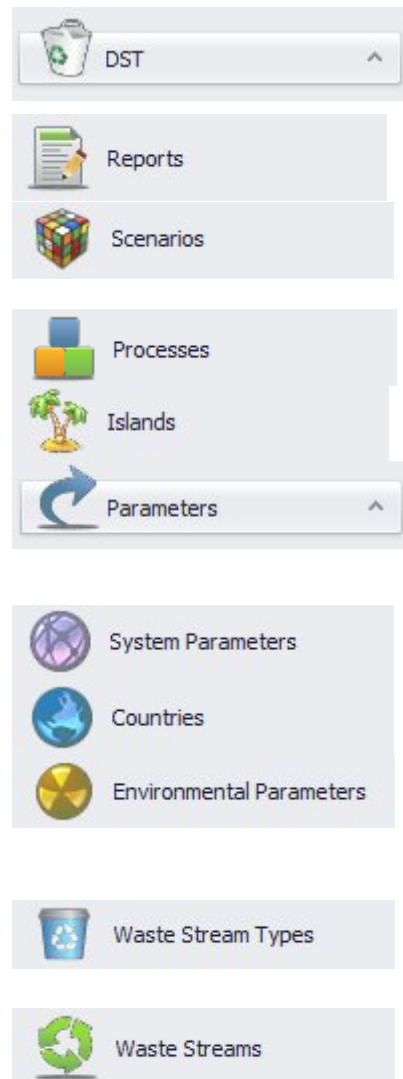
Click the arrow on the right side of DST in order to hide/show the available choices for the DST selection.

Click on Reports in order to view and print the available reports.

Click on Scenarios in order to view/edit and print the available scenarios or insert a new scenario.

Click on Processes in order to view the available processes or insert a new process.

Click on Islands in order to view/edit existing island data or insert a new island.

Click the arrow on the right side of Parameters in order to hide/show the available choices for the Parameters selection.

Click on System Parameters in order to view/edit the existing global parameters.

Click on Countries in order to view/edit existing countries or insert a new country.

Click on Environmental Parameters in order to view/edit existing environmental parameters or insert a new environmental parameter.

Click on Waste Stream Types in order to view/edit existing waste stream types or insert a new waste stream type.

Click on Waste Streams in order to view/edit existing waste streams or insert a new waste stream.

Data area

In this area the relevant data for:

- [Reports](#)
- [Scenarios](#)
- [Processes](#), and
- [Islands](#)

appear. Please refer to the relevant chapters for the explanation of data presented in this area.

Reports

The data area for the reports has 2 sections:

The list of available reports   **The list of available scenarios (Report parameters)**

How to **print** a report:

- Choose a scenario by clicking on the relevant row of the list of available scenarios. An arrow appears on the left side of the selected row.
- Choose a report by double-clicking a report from the list of available reports or by clicking on a report and then click on the print button at the top-left corner of the data area.

The report is displayed in preview mode:

You have the following options:

🔍		Search	Searches the report for specific text or phrase.
📂		Open	Opens a preview document (prnx file).
💾		Save	Saves the preview document (as prnx file).
🖶		Print…	Prints the report to a selected printer.
🖨		Print	Prints the report to the default printer.
		Page Setup	Sets the size, orientation and margins of the report to be printed.
		Scale	Scales the report to be printed.
✋		Hand	Scrolls around the pages of the report.
🔍		Magnifier	Magnifies the report (zoom in/zoom out).
🔍 100% ▼ 🔍		Zoom out Zoom Zoom in	Zooms in/out and to a specified scale.
⏮ ◀ ▶ ⏭		First Previous Next Last	Jumps to the first, previous, next or last page of the document.
		Multiple pages	Displays a selected number of pages in the same preview pane.
		Color…	Colors the background of the document with the selected color.
		Watermark…	Places a text or image watermark to the document
		Export Document…	Exports the document to a specified file format. Formats supported (among others) are: pdf, html, xls, xlsx.
		Send via email…	Sends the report via email
❌		Exit	Closes the preview pane.

All options are also available through the 3 menu options at the top: File, View, and Background.

Scenarios

The data area for the scenarios has 2 sections.

The **upper part** of the data area displays the list of available scenarios.

The **lower part** of the data area displays the description and comments of the selected scenario.

If you want to **sort** the list of scenarios:

- Press any of the grid labels (Country, Island, Stream Type or Scenario). A small up/down arrow appears at the right side of the selected label.
- The list of scenarios is displayed in ascending/descending order.

If you want to **filter** the list of scenarios:

- Type the filter criteria in the blank cells under the grid labels. While typing, the list of scenarios is constantly changing to display the scenarios that fulfill the criteria.
- Press the Close (x) button at the bottom of the grid to clear the filter criteria.

If you want to **add a new scenario**, press the 'Add' button at the top of the data area. For details, please refer to the 'Add a new scenario' chapter.

If you want to **edit an existing scenario**, select it from the list of scenarios and press the 'Edit' button at the top of the data area. For details, please refer to the 'Edit an existing scenario' chapter.

If you want to **delete a scenario**, select it from the list of scenarios and press the 'Delete' button at the top of the data area.

If you want to **print a report** for a selected scenario:

- Select a scenario from the list of scenarios;
- Press the 'Print' button at the top of the data area.
- Select a report
- For details on reports please refer to the 'Reports' chapter.

Add a new scenario

If you want to add a new scenario, click the button 'Add' on top of the data area. The following form is displayed:

Enter the following data:

- **Country**: Select a country from the list of countries by clicking the arrow at the right side of the country field and then press the Tab button on your keyboard. If the country does not exist in the list you must first add the country; in that case please refer to the relevant chapter of the manual: Countries.
- **Island**: Select an island from the list of islands by clicking the arrow at the right side of the island field and then press the Tab button on your keyboard. If the island does not exist in the list you must first add the island; in that case please refer to the relevant chapter of the manual: Islands.
- **Name**: Type the name of the scenario and then press the Tab button on your keyboard.
- **Description**: Type the description of the scenario and then press the Tab button on your keyboard.

- **Stream Type**: Select a waste stream type from the list of waste stream types by clicking the arrow at the right side of the field and then press the Tab button on your keyboard. If the waste stream type does not exist in the list you must first add it; in that case please refer to the relevant chapter of the manual: Waste Stream Types.
- **Comments**: Type any comments for the scenario and then press the Tab button on your keyboard.
- **Waste streams**: Select a waste stream from the list of waste streams by clicking the arrow at the right side of the field. If the waste stream does not exist in the list you must first add it; in that case please refer to the relevant chapter of the manual: Waste Streams. Continue by selecting the processes which refer to this waste stream.
- **Processes**:
  - Click on the 'Sequence No' field and press Tab. Note: the program automatically numbers the processes. You may however give your own number to the process.
  - Select a process from the list of processes by clicking the arrow at the right side of the field and then press the Tab button on your keyboard. If the process does not exist in the list you must first add it; in that case please refer to the relevant chapter of the manual: Processes.
  - Type the % of input waste that is involved in the scenario and press Tab. Examples of input wastes can be found at the existing scenarios.
  - Type the Cost (€/tn) of the process for the specific waste stream and press Tab. Examples of costs can be found at the existing scenarios.
  - Enter as many processes as you want for the specific waste stream.

Note: You may enter as many waste streams and as many processes you want. Please keep in mind that each waste stream may have one or more processes.

To **save the data**, press the 'Save' button.

To **close the form**, press the 'Close' button.

If you made changes to the values and you press the 'Close' button without pressing the 'Save' button, the following message appears:
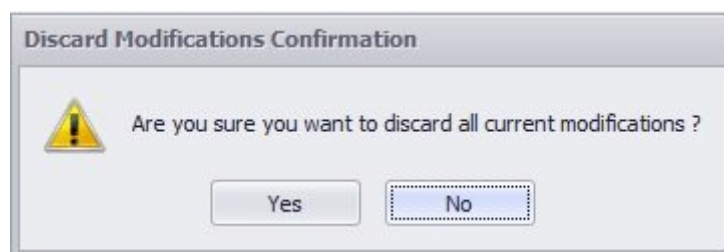
Press 'Yes' to discard all modifications.

Press 'No' to return to the form.

Edit an existing scenario

If you want to edit an existing scenario, double-click a scenario from the list of scenarios in the data area or click a scenario and press the 'Edit' button on top of the data area. The following form is displayed:

Edit the relevant data you want to change.

Change of Stream Type: You cannot change the stream type without first deleting all the waste streams in the scenario. In case you try to change the stream type in a scenario that contains waste streams, the following message will be displayed:
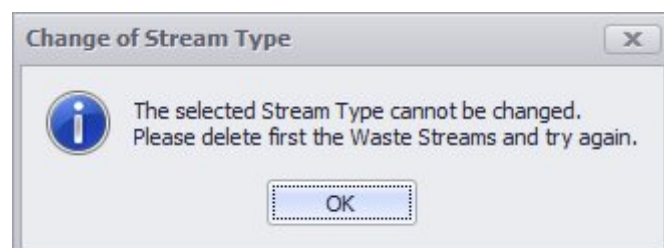
If you want to **delete** a **process**:

- Select a process by clicking on the relevant row. A small arrow appears at the left side of the grid.
- Press the minus symbol (-) at the bottom of the grid.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **delete** a **waste stream**:

- Select a waste stream by clicking on the relevant row. A small arrow appears at the left side of the grid.
- Press the minus symbol (-) at the bottom of the grid.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.
- <u>Not able to delete Waste Streams</u>: You cannot delete a waste stream without first deleting all the processes of this waste stream. In case you try to delete a waste stream that contains processes, the following message will be displayed:
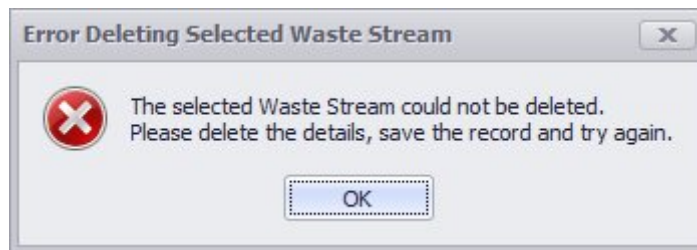
Processes

The data area of the Processes displays the list of available processes.

If you want to **sort** the list of processes:

- Press any of the grid labels (Process, Description or Comments). A small up/down arrow appears at the right side of the selected label.
- The list of processes is displayed in ascending/descending order.

If you want to **filter** the list of processes:

- Type the filter criteria in the blank cells under the grid labels. While typing, the list of processes is constantly changing to display the processes that fulfill the criteria.
- Press the Close (x) button at the bottom of the grid to clear the filter criteria.
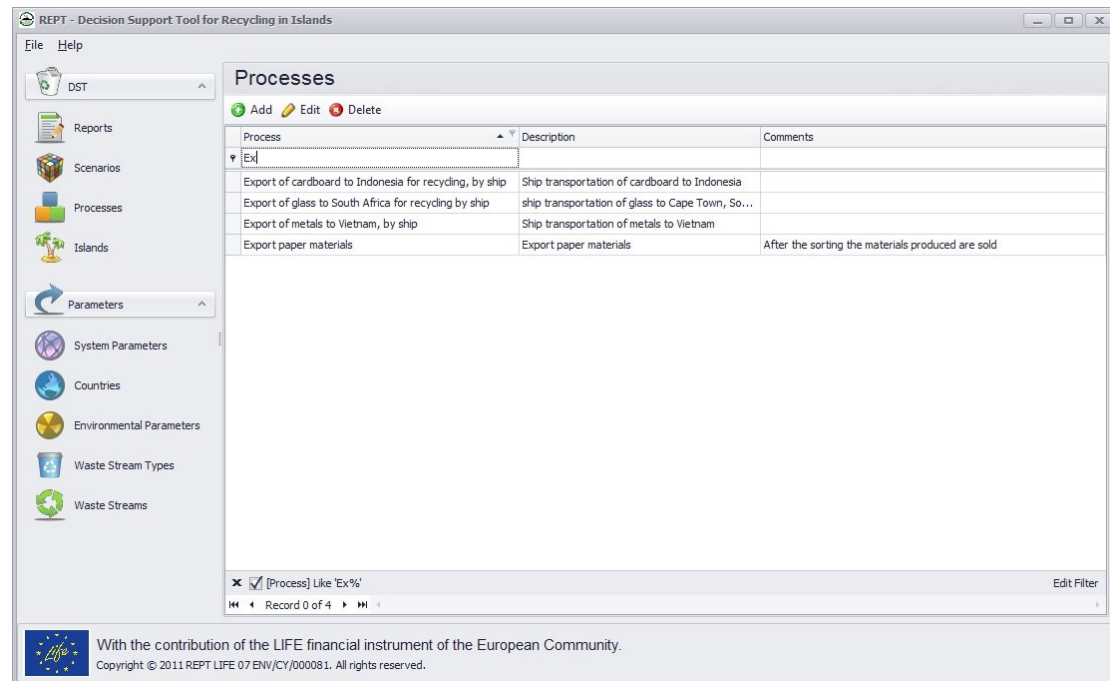
If you want to **add a new process**, press the 'Add' button at the top of the data area. For details, please refer to the 'Add a new process' chapter.

If you want to **edit an existing process**, select it from the list of processes and press the 'Edit' button at the top of the data area. For details, please refer to the 'Edit an existing process' chapter.

If you want to **delete a process**, select it from the list of processes and press the 'Delete' button at the top of the data area. In case the process is used in a scenario, the following message will be displayed and the system will not let you delete the process:

Add a new process

If you want to add a new process, click the button 'Add' on top of the data area. The following form is displayed:

Enter the following data:

- **Stream Type**: Select a waste stream type from the list of available waste stream types by clicking the arrow at the right side of the stream type field and then press the Tab button on your keyboard. If the stream type does not exist in the list you must first add the stream type; in that case please refer to the relevant chapter of the manual: waste stream types.
- **Name**: Type the name of the process and then press the Tab button on your keyboard.
- **Description**: Type the description of the process and then press the Tab button on your keyboard.
- **Process Type**: Select a process type from the list of the 3 process types by clicking the arrow at the right side of the field and then press the Tab button on your keyboard. The 'Details' part of the form will be filled with data depending on the process type:

o **Process Type: Sorting**

Details	
Energy consumption (Kwh/t)	0,00
Capacity of sorting facility (t/year)	0,00

If you select 'Sorting', you must type the energy consumption in kWh/tn. The value (in g/tn) of the environmental parameters will be calculated based on that field. The field 'Capacity of sorting facility' is informational.

o **Process Type: Collection/Transport**

Details	
Vehicle type	▼
Mean load of vehicle (tn/trip)	0,00
Distance per trip (km/trip)	0,00
Number of trips (trip/year)	0,00

If you select 'Collection/Transport', you must first select the Vehicle type (Private car, Truck, Ship, or Train). Type the mean load of the vehicle (in tn/trip) and the distance per trip (in km/trip). The field 'Number of trips' (trips/year) is informational.

o **Process Type: Treatment**

Details	
Energy consumption (Kwh/t)	0,00
Energy production (Kwh/t)	0,00
Energy saving (Kwh/t)	0,00

If you select 'Treatment', you must type the energy consumption in kWh/tn. Then type the energy production on kWh/tn and the energy saving in kWh/tn.

- **Comments**: Type any comments for the process and then press the Tab button on your keyboard.
- **Environmental Parameters**:
  - Select an environmental parameter from the list of environmental parameters by clicking the arrow at the right side of the field and then press the Tab button on your keyboard. If the environmental parameter does not

exist in the list you must first add it; in that case please refer to the relevant chapter of the manual: Environmental Parameters.

- o Type the emission rate of the environmental parameter and press Tab. Examples of emission rates can be found at the existing processes.
- o The value (in g/tn) will be automatically calculated according to the data entered in the Details section of the form. For explanation on the calculations please refer to the relevant chapter of the manual: Explanation of calculations.
- o Enter as many environmental parameters as you want for the specific process.

To **save the data**, press the 'Save' button.

To **close the form**, press the 'Close' button.

If you made changes to the values and you press the 'Close' button without pressing the 'Save' button, the following message appears:
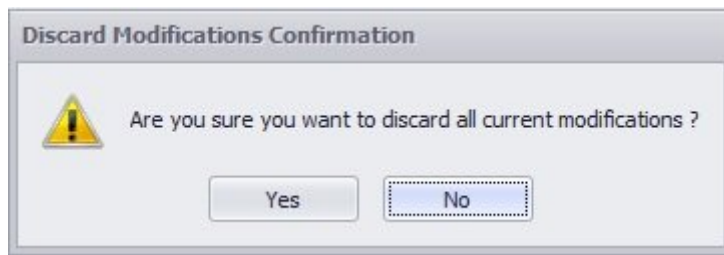
Press 'Yes' to discard all modifications.

Press 'No' to return to the form.

Edit an existing process

If you want to edit an existing process, double-click a process from the list of processes in the data area or click a process and press the 'Edit' button on top of the data area. The following form is displayed:

Edit the relevant data you want to change.

If you want to **delete** an **environmental parameter**:

- Select an environmental parameter by clicking on the relevant row. A small arrow appears at the left side of the grid.
- Press the minus symbol (-) at the bottom of the grid.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

Islands

This is the part of the tool where waste quantities and future projections of produced waste are calculated.

Waste production in islands involves mainly waste produced by the local residences and the tourist population visiting the island. The calculations are based on the per capita waste production of both populations. The waste quantities are used in the financial cost and environmental cost assessment carried out in the DST.

The data area of the Islands displays the list of available islands.

If you want to **sort** the list of islands:

- Press any of the grid labels (Country, Island, Population for the base year, Yearly population increase rate, Yearly production per capita Population for PPW, Yearly production per Capita Population for WEEE, Tourist Population for the base year, Yearly tourist population increase rate, Yearly production per capita tourist population for PPW, Yearly production per capita tourist population for WEEE, Mean tourist residence days or Comments). A small up/down arrow appears at the right side of the selected label.
- The list of islands is displayed in ascending/descending order.
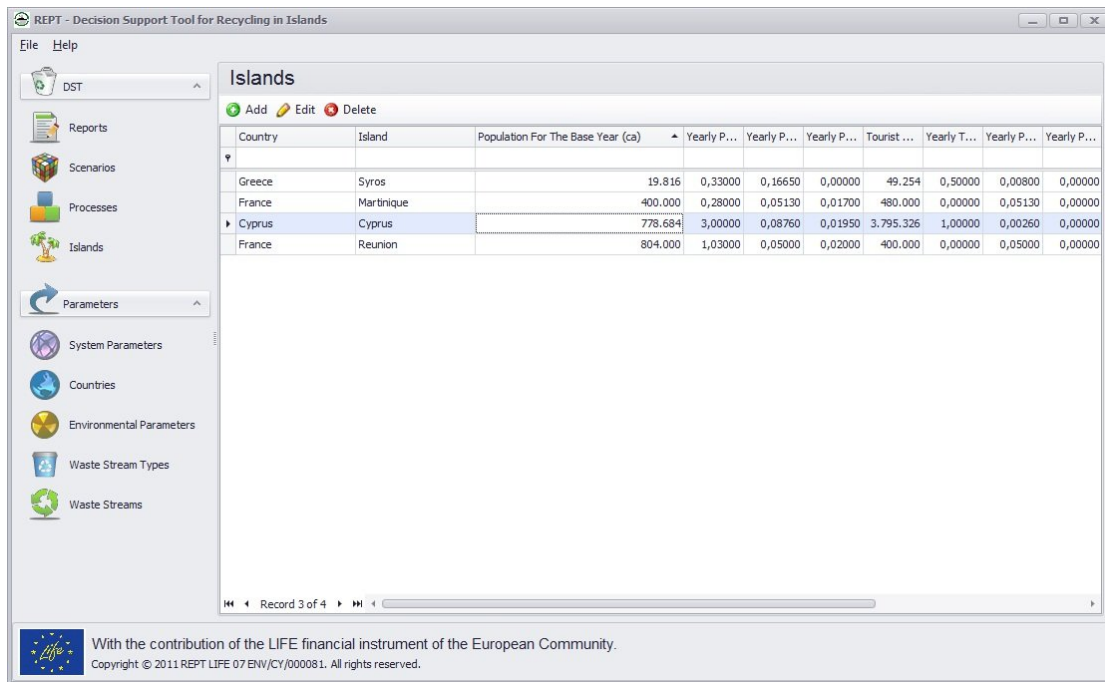
If you want to **filter** the list of islands:

- Type the filter criteria in the blank cells under the grid labels. While typing, the list of islands is constantly changing to display the islands that fulfill the criteria.
- Press the Close (x) button at the bottom of the grid to clear the filter criteria.

If you want to **add a new island**, press the 'Add' button at the top of the data area. For details, please refer to the 'Add a new island' chapter.

If you want to **edit an existing island**, select it from the list of islands and press the 'Edit' button at the top of the data area. For details, please refer to the 'Edit an existing island' chapter.

If you want to **delete an island**, select it from the list of islands and press the 'Delete' button at the top of the data area. In case the island has a scenario, the following message will be displayed and the system will not let you delete the island:

Add a new island

If you want to add a new island, click the button 'Add' on top of the data area. The following form is displayed:

Enter the following data:

- **Name**: Type the name of the island and then press the Tab button on your keyboard.
- **Country**: Select a country from the list of available countries by clicking the arrow at the right side of the country field and then press the Tab button on your keyboard. If the country does not exist in the list you must first add the country; in that case please refer to the relevant chapter of the manual: Countries.
- **Population data**:
  - o **Population for the base year (ca):** Type the population for the base year and then press the Tab button on your keyboard. The base year is referred in the relevant chapter of the manual: System Parameters.
  - o **Yearly increase rate (%)**: Type the yearly increase rate as a percentage and then press the Tab button on your keyboard.
  - o **Yearly production per capita for PPW (tn/ca/y)**: Type the yearly production per capita for PPW in tn/ca/y and then press the Tab button on your keyboard.

- o **Yearly production per capita for WEEE (tn/ca/y)**: Type the yearly production per capita for WEEE in tn/ca/y and then press the Tab button on your keyboard.
- **Tourist data:**
    - o **Population for the base year (ca):** Type the population for the base year and then press the Tab button on your keyboard. The base year is referred in the relevant chapter of the manual: System Parameters.
    - o **Yearly increase rate (%)**: Type the yearly increase rate as a percentage and then press the Tab button on your keyboard.
    - o **Yearly production per capita for PPW (tn/ca/y)**: Type the yearly production per capita for PPW in tn/ca/y and then press the Tab button on your keyboard.
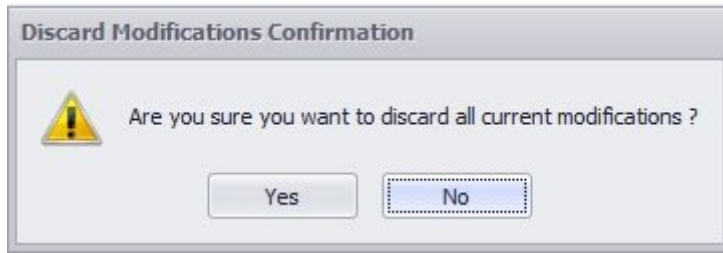   - o **Yearly production per capita for WEEE (tn/ca/y)**: Type the yearly production per capita for WEEE in tn/ca/y and then press the Tab button on your keyboard.
    - o **Mean tourist residence days (d/y)**: Type the mean tourist residence days in days/year and then press the Tab button on your keyboard.
- **Comments**: Type the comments of the island and then press the Tab button on your keyboard.
- **Yearly Production per Capita (tn/ca/y)**:
    - o Select a waste stream from the list of waste streams by clicking the arrow at the right side of the field and then press the Tab button on your keyboard. If the waste stream does not exist in the list you must first add it; in that case please refer to the relevant chapter of the manual: Waste Streams.
    - o Type the **yearly production population** of the waste stream and press Tab. Examples of yearly production population of the waste stream can be found at the existing islands.
    - o Type the **yearly production tourist** of the waste stream and press Tab. Examples of yearly production tourist of the waste stream can be found at the existing islands.
    - o Enter data for all the waste streams (if they exist).

To **save** the data, press the 'Save' button.

To **make the projections** for population and quantities for 20 years (base year + 19 consecutive years), press the 'Save' button and then press the 'Recalculate' button. Please refer to the relevant chapter of the manual for the explanation of the island's calculations: Calculations for the island.

To **close** the form, press the 'Close' button.

If you made changes to the values and you press the 'Close' button without pressing the 'Save' button, the following message appears:

Discard Modifications Confirmation

Are you sure you want to discard all current modifications ?

Yes   No

Press 'Yes' to discard all modifications.

Press 'No' to return to the island form.

Edit an existing island

If you want to edit an existing island, double-click an island from the list of islands in the data area or click an island and press the 'Edit' button on top of the data area. The following form is displayed:

Edit the relevant data you want to change.

If you want to **delete** a **waste stream**:

- Select a waste stream by clicking on the relevant row. A small arrow appears at the left side of the grid.
- Press the minus symbol (-) at the bottom of the grid.
- Press the 'Save' button to save your changes.

Press the 'Close' button to discard your changes.

Calculations for the island

The **population** data, the **tourist** data and the **yearly production per capita** data are used to make the projection of the total population of the island and the quantities of the waste streams for 20 years.

Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2
▸ Population	19.816,00	19.881,00	19.947,00	20.013,00	20.079,00	20.145,00	20.211,00	20.278,00	20.345,00	20.412,00	20.479,00	20.547,00	20.615,00	20.683,00	20.751,00	20.819,00	20.8
Tourist	49.254,00	49.500,00	49.747,00	49.996,00	50.246,00	50.497,00	50.749,00	51.003,00	51.258,00	51.514,00	51.772,00	52.031,00	52.291,00	52.552,00	52.815,00	53.079,00	53.3
TotalPW	3.693,40	3.706,19	3.719,15	3.732,13	3.745,12	3.758,12	3.771,12	3.784,31	3.797,51	3.810,71	3.823,93	3.837,32	3.850,73	3.864,14	3.877,56	3.891,00	3.9
TotalWEEE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
Paper	1.331,80	1.336,43	1.341,09	1.345,76	1.350,45	1.355,15	1.359,87	1.364,61	1.369,36	1.374,14	1.378,92	1.383,73	1.388,55	1.393,39	1.398,25	1.403,13	1.4
Glass	471,33	472,97	474,62	476,27	477,93	479,59	481,26	482,93	484,61	486,30	487,99	489,69	491,39	493,10	494,82	496,54	4
Metal	428,76	430,25	431,74	433,25	434,75	436,26	437,78	439,30	440,83	442,36	443,90	445,45	447,00	448,55	450,11	451,68	4
Plastic	1.456,58	1.461,65	1.466,73	1.471,83	1.476,95	1.482,09	1.487,25	1.492,42	1.497,62	1.502,83	1.508,06	1.513,31	1.518,58	1.523,87	1.529,17	1.534,50	1.5
Residue	8.939,15	8.970,25	9.001,47	9.032,81	9.064,25	9.095,80	9.127,47	9.159,25	9.191,14	9.223,15	9.255,27	9.287,50	9.319,85	9.352,32	9.384,90	9.417,60	9.4
Drink cartons	146,05	146,56	147,07	147,58	148,10	148,61	149,13	149,65	150,17	150,69	151,22	151,74	152,27	152,80	153,33	153,87	1
Printed paper	1.331,21	1.335,85	1.340,49	1.345,16	1.349,84	1.354,54	1.359,26	1.363,99	1.368,74	1.373,50	1.378,29	1.383,09	1.387,90	1.392,74	1.397,59	1.402,46	1.4

The first column of the grid contains the following fields:

- Population
- Tourist
- Total PPW (Packaging Waste)
- Total WEEE
- All the waste streams that were defined in the relevant grid of the island form.

For all these fields the projected data for 20 years are displayed in 20 columns. You may scroll the form using the scroll bar at the bottom of the form. The data for PPW, WEEE and waste streams refer to quantities in tons.

You may **clear all calculations** by pressing the 'Clear' button on the form.

To **recalculate**, press the 'Recalculate' button on the form.

To **print the calculations**, press the 'Print' button on the form. The following form is displayed:

Please refer to the relevant chapter of the manual for the explanation of this form's interface: Reports.

System Parameters

The 'System Parameters' form display the global parameters that are unique for all islands and countries.

If you alter the numbers in this form, the results of calculations for islands and processes will be affected:
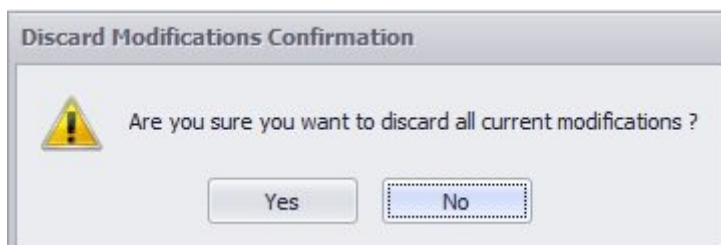
- The base year is used as the beginning year for predictions of waste stream quantities (island).
- The fuel consumption values are used to calculate the quantity (g/tn) of the environmental parameters in the process.

To change a value, click using your mouse on the relevant field and type the new value.

To save the data, press the 'Save' button.

To close the form, press the 'Close' button.

If you made changes to the values and you press the 'Close' button without pressing the 'Save' button, the following message appears:

Press 'Yes' to discard all modifications. Press 'No' to return to the form.

Countries

The 'Countries' form display the list of existing countries.

If you want to **add a new country**:

- Double-click inside the last blank row of the grid where a small star is shown. The star turns into a pencil and the cursor blinks in the beginning of the row. Type the name of the new country. While typing press the Esc button in the keyboard to clear the data typed.
- Press the Enter or Tab button in the keyboard.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **edit the name of a country**:

- Double-click inside the row of the grid. The star turns into a pencil and the country name is highlighted. Edit the name of the country. While typing press the Esc button in the keyboard to keep the original name.
- Press the Enter or Tab button in the keyboard.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **delete** a country:

- Select a country by clicking on the relevant row. A small arrow appears at the left side of the grid.
- Press the minus symbol (-) at the bottom of the grid.
- In case this country has scenarios, the application will not let you delete it. You must first delete all [scenarios](#) of the country.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **sort** the list of countries:

- Press the label 'Country Name'. A small up/down arrow appears.
- The list of countries is displayed in ascending/descending order.

If you want to **filter** the list of countries:

- Double-click inside the blank row of the grid under the label 'Country Name'. Type the filter criteria. While typing the list of countries is constantly changing to display the countries that fulfill the criteria.
- Press the Close (x) button at the bottom of the grid to clear the filter criteria.

Environmental Parameters

The 'Environmental Parameters' form displays the list of existing environmental parameters.

If you want to **add a new environmental parameter**:

- Double-click inside the last blank row of the grid where a small star is shown. The star turns into a pencil and the cursor blinks in the beginning of the row. Type the name of the new environmental parameter. While typing press the Esc button in the keyboard to clear the data typed.
- Press the tab button in your keyboard to choose the comments field.
- Click on the comments field in order to show the comments box.
- Type in the comments box.
- Press the Enter or Tab button in the keyboard.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **edit the data of an environmental parameter**:

- Double-click inside the row of the grid. The star turns into a pencil and the name/comment is highlighted. Edit the name/comments of the environmental parameter. While typing press the Esc button in the keyboard to keep the original name.
- Press the Tab button in the keyboard.
- Press the 'Save' button to save your changes.

- Press the 'Close' button to discard your changes.

If you want to **delete** an environmental parameter:

- Select an environmental parameter by clicking on the relevant row. A small arrow appears at the left side of the grid.
- Press the minus symbol (-) at the bottom of the grid.
- In case this environmental parameter is involved in processes, the application will not let you delete it. You must first delete all [processes](#) where this environmental parameter is involved.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **sort** the list of environmental parameters:

- Press the label 'Environmental Parameter' or the label 'Comments'. A small up/down arrow appears.
- The list of environmental parameters is sorted in ascending/descending order.

If you want to **filter** the list of environmental parameters:

- Double-click inside the blank row of the grid under the label 'Environmental Parameter' or under the label 'Comments'. Type the filter criteria. While typing, the list of environmental parameters is constantly changing to display the parameters that fulfill the criteria.
- Press the Close (x) button at the bottom of the grid to clear the filter criteria.

Waste Stream Types

The 'Waste Stream Types' form displays the list of existing waste stream types.

If you want to **add a new waste stream type**:

- Double-click inside the last blank row of the grid where a small star is shown. The star turns into a pencil and the cursor blinks in the beginning of the row. Type the name of the new waste stream type. While typing press the Esc button in the keyboard to clear the data typed.
- Press the Enter or Tab button in the keyboard.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **edit the name of a waste stream type**:

- Double-click inside the row of the grid. The star turns into a pencil and the waste stream type is highlighted. Edit the name of the waste stream type. While typing press the Esc button in the keyboard to keep the original name.
- Press the Enter or Tab button in the keyboard.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **delete** a waste stream type:

- Select a waste stream type by clicking on the relevant row. A small arrow appears at the left side of the grid.
- Press the minus symbol (-) at the bottom of the grid.
- In case this waste stream type has scenarios, processes or waste streams, the application will not let you delete it. You must first delete all processes, scenarios and waste streams where this waste stream type is involved.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **sort** the list of waste stream types:

- Press the label 'Waste Stream Type'. A small up/down arrow appears.
- The list of waste stream types is displayed in ascending/descending order.

If you want to **filter** the list of waste stream types:

- Double-click inside the blank row of the grid under the label 'Waste Stream Type'. Type the filter criteria. While typing the list of waste stream types is constantly changing to display the waste stream types that fulfill the criteria.
- Press the Close (x) button at the bottom of the grid to clear the filter criteria.

Waste Streams

The 'Waste Streams' form displays the list of existing waste streams.

Waste Stream T... ▲	Waste Stream	NationalRecoveryRat...	NationalRecyclingRate ...	EU Recovery Rate (%)	EU Recyclir
⏻					
▶ PW ▼	Paper		60		
PW	Glass		60		
PW	Plastic		23		
PW	Metal		50		
PW	Residue				
PW	Drink cartons				
PW	Printed paper				
WEEE	Refrigerators & air-conditions	80	75	80	
WEEE	TVs & monitors	75	65	75	
WEEE	Energy-saving lamps	70	80	70	
✱					

|◀ ◀ Record 1 of 10 ▶ ▶▶| + − ▲ ✓ ✕ ◀

If you want to **add a new waste stream**:

- Click inside the first cell of the last blank row of the grid where a small star is shown.
- Choose the waste stream type from the list and press the Tab button in the keyboard.
- Type the name of the new waste stream. While typing press the Esc button in the keyboard to clear the data typed.
- Press the tab button in your keyboard to choose the next field.
- Continue the same way to enter data in all cells of the row.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **edit the data of a waste stream**:

- Double-click inside any cell of the relevant row. The star turns into a pencil and the field data are highlighted. Edit the data. While typing press the Esc button in the keyboard to keep the original data.
- Press the Tab button in the keyboard.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **delete** a waste stream:

- Select a waste stream by clicking on the relevant row. A small arrow appears at the left side of the grid.
- Press the minus symbol (-) at the bottom of the grid.
- In case this waste stream is involved in processes or scenarios, the application will not let you delete it. You must first delete all processes and scenarios where this waste stream is involved.
- Press the 'Save' button to save your changes.
- Press the 'Close' button to discard your changes.

If you want to **sort** the list of waste streams:

- Press anyone of the labels. A small up/down arrow appears.
- The list of waste streams is sorted in ascending/descending order.

If you want to **filter** the list of waste streams:

- Double-click inside any cell of the blank row of the grid under the labels row. Type the filter criteria. While typing, the list of waste streams is constantly changing to display the parameters that fulfill the criteria.
- Press the Close (x) button at the bottom of the grid to clear the filter criteria.

Explanation of Calculations

Calculations in the Island Form

The Island Form is used to estimate waste production in the base year and a period of 19 years in the future. Waste production has two main parameters: waste produced by the local population and waste produced by tourists visiting the area under examination. The tourist factor is especially applicable to islands since tourists visiting a specific island are usually many times more than the actual local population.

The way waste production is estimated in the DST is presented in the box below.

Total quantity of PPW = (Yearly production per capita population for PPW * Local Population) + (Yearly production per capita tourist population for PPW * Tourist Population)

Total quantity of WEEE = (Yearly production per capita population for WEEE *Local Population) + (Yearly production per capita tourist population for WEEE * Tourist Population)

Calculations in the Process Form

The data provided in the Process Form are used in the estimation of the environmental externalities of an individual waste management process and later on a waste management scenario.

The **value of the environmental parameters** is calculated automatically by the program and depends on the process type.

If the process type selected is '**Collection/Transport**', the equation for the calculation of the value is:

Value (g/tn waste) = Fuel consumption of the vehicle (L/km) * Distance per trip (km/trip) * Emission rate / Mean load of vehicle (tn/trip)

The Fuel consumption of the vehicle is taken from the relevant field at the System Parameters form. If the user chooses:

- the private car as vehicle, the value of the field 'Private car' is used;
- the truck as vehicle, the value of the field 'Truck' is used;
- the train as vehicle, the value of the field 'Train' is used;
- the ship as vehicle, the value of the field 'Ship' is used.

If the process type selected is '**Sorting**', the equation for the calculation of the value is:

Value (g/tn waste) = Energy consumption (kWh/tn) * Emission rate

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If the process type selected is '**Treatment**', the equation for the calculation of the value is:

Value (g/tn waste) = [Energy consumption (kWh/tn) + Energy production (kWh/tn) – Energy saving (kWh/tn] * Emission rate

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Assumptions and datasets

The majority of data fields in the DST are open for the user to alter according to her/his needs. However, in order to assist the user in operating the DST a dataset containing all the assumptions and data used by the development team in the implementation phase of the DST was comprised and is presented below.

System Parameters Form

In this form data regarding fuel consumption of the waste transport means considered in the DST are presented. The four transport means considered are: private car, truck, train and ship.

The fuel consumption values are used to calculate the quantity (g/tn) of the environmental parameters in the relevant processes considered. Typical fuel consumptions used by the project team are presented in the box below.

Transport Type	Fuel Consumption		Data Source
Private Car	0.09	L/km	(ecoinvent report N14 p.39) for a 1.4-2.0 L
Truck	0.3	L/km	(ecoinvent report N14) for a 16t lorry
Train	2.5	L/tn km	1)Green from the Start (July 2009), Association of American Railroads) 2) for a diesel freight train with capacity 500tn
Ship	104.6	L/km	(ecoinvent report N14) for a 50000dwt transoceanic dry bulk carrier

Process Form

Typical emission rates for the environmental parameters related to collection/ transport processes are:

Transport Type	Environmental Parameter Emission Rates (g/L)				Data Sources
	CO_2	NOx	SO_2	Ammonia	
Private Car	2300	0.1	0.5	0.01	Ecoinvent report N14 .p39- for a 1.4-2.0 L petrol car
Truck	2646	0.1312	0.505	0.01988	Ecoinvent report N13- for a 16t lorry (adjusted for stop & go driving)
Train	2628.18	33.48	0.50	0.02	1) 2006 IPCC Guidelines for National Greenhouse Gas Inventories- Vol.2 2) Ecoinvent report N14. p104- emission indices for diesel locomotives -Table 6.9
Ship	2577.96	5.01	58.59	-	Ecoinvent report N14 p.175

Sorting processes require as input data the Energy Consumption of the sorting facility in kWh/tn of waste sorted. A field for the capacity of the sorting facility (tons sorted per year) is also available in order to give an idea of the sorting facility under assessment. The latter figure IS NOT included in the calculations and serves only an informative purpose.

Type of sorting facility	Energy consumption (kWh/tn)		Data Source
PPW	20.00	kWh/tn	Actual sorting facility energy consumption (in Cyprus) and bibliographical sources for a 12000t/year facility
WEEE	38.2	kWh/tn	R.Hischier et al. 2005

The main environmental impact associated with sorting facilities is the consumption energy (the production of residue waste is considered as a different 'process' in the DST). The consumption of electricity is related to atmospheric emissions of the following main pollutants.

Type of sorting facility	Environmental Parameter Emission Rates (g/kWh)			Data Source
	CO_2	NOx	SO_2	
PPW	830.23	1.73	6.11	Estimated based on figures from the Statistics and prospects for the European electricity sector (1980-2000, 2004, 2005, 2006 2010-2030) (EURPROG 2008)
WEEE	830.23	1.73	6.11	